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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,938	03/09/2004	Ron Naftali	9157	4473
57605 7590 07/07/2010 APPLIED MATERIALS, INC. C/O SONNENSCHN NATH & ROSENTHAL LLP P.O. BOX 061080 WACKER DRIVE STATION, WILLIS TOWER CHICAGO, IL 60606-1080			USA/PDC/PDC/EZILBER EXAMINER LIU, MICHAEL	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/796,938

**Applicant(s)**

NAFTALI, RON

**Examiner**

Michael Liu

**Art Unit**

2882

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 June 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3 and 4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3 and 4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2008 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. Receipt is acknowledged of the Amendment filed on 22 June 2010. By the amendment, claim 1 has been amended, and claims 5 and 7-9 have been canceled. Accordingly, claims 1, 3, and 4 are pending in the instant application.
2. Despite the claim amendments and Applicant's arguments, Fukuda and Lu are maintained. The cancellation of claim 9 has rendered the Meshulach rejection moot.

### ***Drawings***

3. The previous drawing objection in section 3 is maintained as seen below, while the amendment to Fig 3 has overcome the previous drawing objection in section 4.
4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the first cross-section and the second cross-section of claims 1 and 3 must be shown or the feature(s) canceled from the claim(s). If these features are already shown in the drawings, then they must be labeled. No new matter should be entered.
5. The drawings are objected to because in Fig 3, "an saturable absorber" should be changed to --a saturable absorber--, and "bean" should be changed to --beam--.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet,

and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Specification***

6. The amendment to the specification has overcome the previous specification objection.
7. The disclosure is objected to because of the following informalities: In [0020], "an saturable absorber" should be changed to --a saturable absorber--, and "bean" should be changed to --beam--. Appropriate correction is required.

***Claim Objections***

8. The cancellation of claim 5 has rendered the claim objection moot.

***Double Patenting***

9. The cancellation of claim 9 has rendered the double patenting rejection moot.

***Claim Rejections - 35 USC § 112***

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1 recites "at least one focused beam of radiation having a first cross-section through an objective lens ... ." The recitation claims that the first cross-section is located at the objective lens. However, [0020] discloses "at least one beam of radiation having a first cross-section towards a saturable absorber ... ." As a result, [0020] suggests that the first cross-section is located at the incident plane of the saturable absorber. Consequently, the specification is contradictory to the claimed recitation regarding the location of the first cross-section. Therefore, claim 1 is rejected as being unclear and indefinite.

b. Claim 3 recites "wherein the second cross-section is about half of the first cross-section." However, Fig 1 does not show the second cross-section, which is the portion of the beam inside intermediate layer 16, being half of the first cross-section, which is claimed to be through the objective lens 20. Rather, Fig 1 shows the second cross-section to be much smaller than half of the first cross-section. As a result, Fig 1 is contradictory to the claim regarding the relationship of the sizes of the first cross-section and the second cross-section. Therefore, claim 3 is rejected as being unclear and indefinite.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1, 3, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda et al (4,904,569).

**Claim 1:** Fukuda discloses a method (Fig 3) for recording a pattern (11), comprising:

determining an illumination scheme (by 21) in response to the pattern;  
directing, in response to the determination, at least one focused (C14L11-12) beam of radiation (C11L62-63: excimer laser) having a first cross-section through an objective lens (12) onto an intermediate layer (44) (Fig 8c), said intermediate layer comprising a reversible transmission film (44), said reversible transmission film configured to allow only a portion of said beam, said portion having a second cross-section (Fig 8d: grooves between 46), to propagate towards a radiation sensitive layer (42), said second cross-section being smaller than the first cross-section, and  
removing said intermediate layer (C16L37-38, Fig 8d) after the pattern has been printed (C16L18-19).

Fukuda does not disclose expressly the reversible transmission film being a saturable absorber.

However, [003] of the instant application states, "A material can be regarded as a saturable absorber if its light absorption decreases with increasing light intensity." Similarly, Fukuda teaches, in C13L43-50, "Further, the transparency of the reversible transmission film depends upon the quantity of exposure light. That is, when a large

quantity of exposure light is incident on the reversible transmission film, the transparency thereof is high. While, when a small quantity of exposure light is incident on the reversible transmission film, the film is not so transparent." Based on these descriptions, a reversible transmission film acts as a saturable absorber, only allowing light transmittance under a large quantity of exposure light, or increasing light intensity.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to recognize that the reversible transmission film of Fukuda has the same properties as a saturable absorber and could be used as such, for the purpose of forming sharp patterns to achieve devices with better performance.

**Claim 3:** wherein the second cross-section (Fig 8d) is about half of the first cross-section.

**Claim 4:** further comprising altering an intensity of the beam of radiation to achieve a certain second cross-section. (C17L6-12: "Further, it is possible to cause the bleaching characteristic of the reversible transmission film to match with the sensitivity of the photoresist layer by appropriately selecting the exposure light quantity and the number of exposure operations, and hence the reversible transmission film can act as an efficient contrast enhancement layer.")

14. Claims 1, 3, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu (7,022,452).

**Claim 1:** Lu discloses a method (15) (Fig 4) for recording a pattern (21), comprising:

determining an illumination scheme in response to the pattern (C3L38-39: inherent in photolithographic method);

directing, in response to the determination, at least one focused beam of radiation (C4L31) having a first cross-section (at surface of 16) through an objective lens (C1L20) onto an intermediate layer (16), said intermediate layer comprising a contrast enhancing layer (16), said contrast enhancing layer configured to allow only a portion of said beam, said portion having a second cross-section (at surface of 10), to propagate towards a radiation sensitive layer (10), said second cross-section being smaller than the first cross-section, and

removing said intermediate layer after the pattern has been printed (C4L56-59).

Lu does not disclose expressly the contrast enhancing layer being a saturable absorber.

However, [003] of the instant application states, "A material can be regarded as a saturable absorber if its light absorption decreases with increasing light intensity." Similarly, Lu teaches, in C4L44-48, "Therefore, contrast enhancing layer 16 allows the high intensity portions of the aerial image ... to be preferentially transmitted to photoresist layer 10." Based on these descriptions, a contrast enhancing layer acts as a saturable absorber, only allowing light transmittance under high intensity portions of the radiation beam.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to recognize that the contrast enhancing layer of Lu has the



same properties as a saturable absorber and could be used as such, for the purpose of forming sharp patterns to achieve devices with better performance.

**Claim 3:** wherein the second cross-section is about half of the first cross-section (Fig 4).

**Claim 4:** further comprising altering an intensity of the beam of radiation to achieve a certain second cross-section (Fig 5).

### ***Response to Arguments***

15. Applicant's arguments with respect to the rejection under Fukuda have been fully considered but they are not persuasive. Applicant argues, "It is unclear from Fukuda's description just what the phrase 'quantity of light' means" (P5L19-20). The examiner respectfully disagrees. The quantity of light can be measured by the amount of current passing through a certain area. Similarly, in physics, intensity is a measure of the time-averaged energy flux and has units of power per area. If the quantity of incident exposure light gets larger, then there is a greater amount of current passing through that same area. Having a larger amount of current per area is equivalent to a larger power per area. As a result, when light quantity gets larger, light intensity increases. Therefore, the phrase "quantity of light" is synonymous with light intensity.

Additionally, Applicant contends, "Second, the reversible transmission layer of Fukuda is limited to enhancing the contrast of a pattern printed on a photoresist layer and does not affect the cross section of a beam" (P5L25-26). The examiner respectfully disagrees. The reversible transmission film of Fukuda does indeed affect the cross section of a beam. During exposure, there is a smaller quantity of exposure light at the

periphery of the exposure area as compared to the center, due to a larger quantity of light being focused at the center. As a result, the beam in the center will be transmitted through the reversible transmission film, while the beam at the periphery will be blocked. Therefore, the reversible transmission film of Fukuda does affect the cross section of the beam. Thus, Applicant's arguments regarding Fukuda are not persuasive.

16. Applicant's arguments with respect to Lu have been fully considered but they are not persuasive. Applicant asserts, "The Office Action admits that Lu does not teach a saturable absorber and the description of the contrast enhancing layer does not necessarily suggest that it operates such the light absorption decreases with increasing light intensity" (P6L3-6). The examiner respectfully disagrees. Fig 5 of Lu shows a graph of transmission vs. dose of the contrast enhancing layer. When dose, which is equivalent to light intensity, is increased, the transmission increases as well. Moreover, transmission and absorption are inversely proportional, because as more light is transmitted, less light is absorbed. As a result, the contrast enhancing layer exhibits decreasing light absorption with increasing light intensity. Consequently, the contrast enhancing layer has the same properties as the saturable absorber of claim 1 and can be used as such. Therefore, Lu discloses that the contrast enhancing layer is a saturable absorber.

### ***Conclusion***

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Liu whose telephone number is 571-272-9019. The examiner can normally be reached on Monday through Friday 9 am - 5 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael Liu/  
06/30/10

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